



P B L S C I E N C E !

PROBLEM BASED LEARNING

Name: _____ Date: _____

The World's Plates Expedition

The Problem

The purpose of this project is for students to create a travel brochure or PowerPoint presentation for a geology-based expedition to major tectonic plates and major land features that form as a result of tectonic activity.

In their presentation, the students will be able to:

1. Identify major tectonic plates including the Eurasian, African, Indo-Australian, Pacific, North American, South American, and Antarctic plates.
2. Describe how plate tectonics causes major geological events, such as ocean basins, earthquakes, volcanic eruptions, and mountain building.

Guiding Question

Are you able to identify major tectonic plates, describe what makes them move, and describe how plate tectonics cause geologic events such as ocean basins, earthquakes, volcanic eruptions, and mountain building?

Mission Deliverable

Students will create a travel brochure or PowerPoint presentation for a geology-based expedition to major tectonic plates and major land features that are a result of tectonic activity.

Key Concepts Addressed

1. Earth's lithosphere is divided into thick tectonic plates. The major tectonic plates are: the African plate, Antarctic plate, Eurasian plate, Indo-Australian plate, North American plate, South American plate, and Pacific plate.
2. Each tectonic plate consists of more dense oceanic material and less dense continental material; the plates float slowly on Earth's soft, underlying asthenosphere. The scientific theory, which describes this motion and the continuous changes in Earth's surface, is called plate tectonics.
3. The motion of tectonic plates results in significant and often dramatic interactions along the plate boundaries. The types of plate motion are classified as: *divergent* (pulling apart), *convergent* (pushing together) or *transform* (lateral).

Performance/College & Career Readiness Goals

Science Standards

- IX. Earth and Space Sciences
 - A. Earth Systems
 2. Possess a scientific understanding of the history of Earth's systems.

Name: _____ Date: _____

The World's Plates Expedition Student Checklist

<p style="text-align: center;">Getting Started</p> <p style="text-align: center;"><u>The Early Earth and Plate Tectonics</u></p> <p style="text-align: center;">DK4 Videos:</p> <p style="text-align: center;"><u>Earthquakes</u></p>	<p style="text-align: center;">Internet Resources</p> <p style="text-align: center;"><u>Plate Tectonics Interactive</u></p> <p style="text-align: center;"><u>The Dynamic Earth</u></p> <p style="text-align: center;"><u>Active Volcanoes and Plate Tectonics, "Hot Spots and The Ring of Fire"</u></p> <p style="text-align: center;"><u>Earth Floor: Plate Tectonics</u></p>
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TASK	RESOURCES	DUE DATE	STATUS/NOTES
Read the "Geology on the Go" Letter	1. "Geology on the Go" Letter		<input type="checkbox"/> Complete <input type="checkbox"/> Not Complete
Complete the "World's Plate Expedition Application."	1. Mac or PC Computer 2. Internet		<input type="checkbox"/> Complete <input type="checkbox"/> Not Complete
Brainstorm and complete the KWL Chart.	1. KWL Chart		<input type="checkbox"/> Complete <input type="checkbox"/> Not Complete

Name: _____ Date: _____

The World's Plate Expedition
Student Checklist *(continued)*

TASK	RESOURCES	DUE DATE	STATUS/NOTES
Identify the major tectonic plates described in the job application, noting their rate and direction of movement.	1. Mac or PC Computer 2. Internet		<input type="checkbox"/> Complete <input type="checkbox"/> Not Complete
Research and take notes on convergent, divergent, and transform boundaries to determine their locations and associated geologic features.	1. Mac or PC Computer with 2. Internet		<input type="checkbox"/> Complete <input type="checkbox"/> Not Complete
Create a travel brochure or PowerPoint for a geology-based expedition to the seven major tectonic plates and major land features that are a result of tectonic activity.	1. Mac or PC Computer, with the MS Publisher or MS PowerPoint Applications		<input type="checkbox"/> Complete <input type="checkbox"/> Not Complete
FINAL DUE DATE:			

Name: _____ Date: _____

The World's Plates Expedition

Rubric and Grade Sheet

Category	Exceeds Expectations 3 points	Meets Expectations 2 points	Below Expectations 1 point	SCORE	Teacher Comments
Content Mastery	Included detail on all components and SCOPE Key Concepts.	Included some detail on most components and SCOPE Key Concepts.	Included little to no detail on components and SCOPE Key Concepts.		
Application of Content	Student correctly supported all SCOPE content AND goals.	Student correctly supported most SCOPE content AND goals.	Student did not support SCOPE content AND goals.		
Research	All information is accurate and is taken from at least 4 sources.	Most information is accurate and is taken from 2-3 sources.	Little to no information is accurate and is taken from one to no sources.		
Presentation	Final product is attractive, all components are easily identified, and the student can clearly dialogue about the project.	Final product is somewhat attractive, most components are easily identifiable, and the student can somewhat dialogue about the project.	Final product is not presented well, components are difficult to identify, and the student cannot clearly dialogue about the project.		
				TOTAL SCORE:	

Name: _____ Date: _____

Appendix: The World's Plates Expedition

Internet Resources

RESOURCE	URL
The Early Earth and Plate Tectonics	http://www.neok12.com/php/watch.php?v=zX637c47465c5e4c755c4f73&t=Earth
D4K Videos: Earthquakes	http://idahoptv.org/dialogue4kids/archive/episodePage.cfm?versionID=215172
Plate Tectonics Interactive	http://www.learner.org/interactives/dynamicearth/drift.html
The Dynamic Earth	http://www.mnh.si.edu/earth/main_frames.html
Active Volcanoes and Plate Tectonics, "Hot Spots" and the "Ring of Fire"	http://vulcan.wr.usgs.gov/Glossary/PlateTectonics/Maps/map_plate_tectonics_world.html
Earth Floor: Plate Tectonics	http://www.cotf.edu/ete/modules/msese/earthsysflr/plates1.html

Name: _____ Date: _____

Student Document #1

**Geology on the Go
9 Wegener Place
New Madrid, MO**

Dear Students of _____ School:

Geology on the Go is a unique travel agency specializing in travel arrangements to locations of major geologic significance around the globe. Our customers are primarily adults seeking to gain more in-depth knowledge about our planet.

We recently received a request from the Texas Rock-On Geologist Group asking us to develop an itinerary that would take a group of 6th grade Geology Magnet School students to every major tectonic plate in the world and set up stops along the way that depict special places of interest, which formed as a result of the plate's movement. Never having prepared tours for middle school students, we need your help in planning this tour. You have done excellent work for the Texas Rock-On Group in the past, so they asked us to contact you with a request to join us in developing a World's Major Plates Expedition for 6th graders.

The group that puts together the best travel itinerary in the next week will be awarded an all expenses paid trip on the World's Major Plates Expedition.

Details of the project are thoroughly explained on the application form.

Sincerely,

Harriet Hess
President, Geology on the Go

Name: _____ Date: _____

World's Major Plates Expedition -- Application Form Student Document #2

Names:

Job Requirements

- The final product can be a detailed travel brochure or a self-running presentation software (maximum 15 slides). The purpose of the brochure/PowerPoint is to convince the Geology Magnet School that this is a valuable educational expedition that will provide the students with extensive geologic expertise and direct observation of plate tectonic activity.
- Stops on the worldwide expedition must include:
 - A general description of how tectonic plates move slowly as they float across the mantle of Earth.
 - A visit to each of the seven major tectonic plates: the African, Antarctic, Eurasian, Indo-Australian, North American, South American, and Pacific plates with brief descriptions of their rate and direction of movement.
 - A visit to an ocean basin plate that formed as a depression in the areas between continents.
 - A visit to two mountain chains that formed at a convergent boundary where two plates collide. One mountain chain has to be uplifted where an ocean plate is colliding with a continental plate. The other mountain chain has to be forming where two continental plates are colliding. For the ocean continent collision, briefly explain which plate is denser and how it is pushed underneath the lighter plate, forming this mountain chain. For the continent-continent collision, briefly explain how the collision is causing the crust to fold upward, resulting in the mountain chain.
 - A visit to a volcano that formed along a convergent boundary. Briefly explain how volcanoes form in this situation.
 - A visit to a region of seafloor spreading along a divergent boundary. Explain which two plates are moving away from each other. Note how rift valleys, mid-ocean ridges, and volcanoes form in this situation.
 - A visit to a major fault along a transform boundary where two plates are moving horizontally past each other causing earthquakes in the region.
- The World's Plates of the World Expedition brochure or presentation is due _____.

Name: _____ Date: _____

KWL Chart – Student Document #3

K What I Know about the Layers of Earth	W What I Need to Learn about Layers of Earth for my Project	L What I Learned about the Layers of Earth

